

ENTRY NO: C-5
Machine Name: HIRFL main cyclotron - SSC
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Institution: Institute of Modern Physics, the Chinese Academy of Sciences
Address Rd Nanchang 363, Lanzhou 730000, PR China
In Charge of Cyclotron: B.W. Wei
Telephone: 0086+931+8274940
Fax: 0086+931+8272100
Person Reporting: Jingyu Tang
Web: imp.lzb.ac.cn
E-mail: jiasu@ns.lzb.ac.cn

HISTORY

Designed By: Institute of Modern Physics

Construction Dates: 1978-1988

First Beam Date: Dec, 1988

CHARACTERISTIC BEAMS

ions	/ energy(MeV/N)	/current(pps)	/power(w)
C 12/12+	80	$2*10^{11}$	32
Ar 36/16+	69	$6*10^{10}$	23
Ar 40/16+	55	$6*10^{10}$	21
Kr 84/26+	25	$6*10^9$	3
Xe 136/30+	15	$2*10^9$	1

transmission efficiency(source to extract beam)

typical: 10% - **best:** 15%

tranverse emittance

emittance definition: 50%

vertical: 10π mm mrad

horizontal: 10π mm mrad

longitudinal: $0.2\% * 40 \text{ deg}(\Delta) E/E\% \times \text{deg RF}$

USES

basic research: 42%

therapy: 0%

development: 5%

isotope production: 0%

other: 18%

maintenance: 20%

beam tuning: 15%

Total Time: 4000h/year

TECHNICAL DATA

a)magnet: **type:** separated sectors

Kb: 450MeV/A **Kf:** 230MeV/A

average field (min/max): 0.92/0.34 T

number of magnet sectors: 4

hill angular width: 52hill angular width

spiral (max): 0 deg

pole parameters

diameter: 7.17 m

injection radius: 1.0 m

extraction radius: 3.21 m

hill gap: 0.10m **valley gap:** m

trim coils

-number: 25x2

-current(max): 600 A-turns

harmonic coils

-number: $11*2 \times N_{\text{sectors}} \times 2$

-current(max): 300 A-turns

main coils

number: 1x2

total ampere-turns: 345600 A-turns

current: 3600 A

stored energy: MJ

weight - iron: 2000t **coils:** 15.6t

power

main coils (total): 740 kW

trim coils (total max): 600 kW

refrigerator (cryogenic): kW

b)RF

acceleration

frequency range: 6.5-14MHz

harmonic modes: 2,4,6

number of dees: 2

number of cavities: 2

dee angular width: 30degrees

voltage

at injection: 100kV(peak to ground, max)

at extraction: 120kV(peak to ground, max)

peak: 120kV(peak to ground, max)

line power(max): 50kW

stability

phase: 0.3 deg

voltage: 0.1%

injection

c)ion source:

external injection:

components:

source bias voltage: kV

injection energy: MeV/N

buncher:

injection efficiency: %

d)injector: HIRFL injector cyclotron - SFC

e)extraction

Bump field, electrostatic deflector, 2 magnetic chanel, two

bending magnets

efficiency

typical: 35%

best: 70%

f)vacuum

pumps: Cryogenic pumps

achieved vacuum: $2*10^{-5}$ Pa

REFERENCES

EXPERIMENTAL FACILITIES

1)On-line Isotope separator 2)In-beam gama-ray measurement device 3)Fast chemistry separation apparatus 4)Irradiation and Material Terminal 5)Atomic Physics Terminal 6)Scattering Chamber 7)RIBLL radioactive ion beam line 8)Heavy ion therapy study terminal (under construction)

COMMENTS